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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/690,912	10/22/2003	Akira Izumi	P/1250-264	6373
2352 7590 07/17/2007 OSTROLENK FABER GERB & SOFFEN 1180 AVENUE OF THE AMERICAS NEW YORK, NY 100368403				
			EXAMINER CHEN, KIN CHAN	
			ART UNIT 1765	PAPER NUMBER
			MAIL DATE 07/17/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/690,912

Applicant(s)

IZUMI ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 June 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7,8,10-12,14,21-24 and 27-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7,8,10-12,14,21-24 and 27-30 is/are rejected.
- 7) ☒ Claim(s) 21,23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 5, 2007 has been entered.

### ***Double Patenting***

2. Claims 21 and 23 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 7 and 11. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 7, 8, 10, 21, 22, 27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (US 5,635,053; hereinafter "Aoki") in view of Okuda et al. (US 2002/0035762; hereinafter "Okuda") as evidenced by Verhaverbeke (US 5,972,123), Tomita et al. (US 6,431,185; hereinafter "Tomita") and Skee (US 6,465,403).

In a method for cleaning the substrate, Aoki (col.1 lines 36 to 47) teaches a first step of applying alkaline solution (e.g., a mixed solution containing an ammonia water and hydrogen peroxide water), and a second step of applying an acid solution (e.g., mixed solution containing hydrochloric acid and hydrofluoric acid) to efficiently clean the surface of a substrate. Aoki also teaches using the cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (col.1, line 42, see also the example starting from col. 1, line 46). Aoki also clearly describes the function of each cleaning solution (specifically, col. 2, lines 28-45). Hence, it would have been obvious to one with ordinary skill in the art to apply cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (or repeating the process) as required for a particular product in order to achieve the required cleanness.

Unlike the claimed invention, Aoki does not disclose rotate the substrate in a horizontal plane during the process and apply injection of droplets formed by mixing the solution with gas. In a method and system for substrate processing, Okuda teaches that

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the substrate may be rotated in a horizontal plane during the process the droplets formed by mixing an alkaline solution (or acid solution) and gas may be injected from a nozzle (so-called injection and collision) to a surface of a substrate. The quality of cleaning process is improved. (abstract; [0028], [0165][0295]; Figures). Hence, it would have been obvious to one with ordinary skill in the art to apply injection of droplets formed by mixing the solution with gas as disclosed by Okuda in the process of Aoki because Okuda teaches that to do so improves the quality of the cleaning process.

The combined prior art is silent about that the etching effect may take place when applying the acid solution in the second step. However, when same acid solution is applied on the same surface of the substrate, it would be expected that the method of the combined prior art would contain the same properties and functions as claimed (such as etching effect on the surface of the substrate).

The above-cited claims differ from the prior art by specifying various process parameters (pH value in claim 22) for the alkaline and acid solutions. However, same are known to be result-effective variables and commonly determined by routine experiments the process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using ordinary temperature and adjusting concentration of alkaline solution for desired pH value) to obtain optimal result with a reasonable expectation of success. See the case laws cited below. Also see *Verhaverbeke* (US 5,972,123; col. 5, lines 25-29; 43-45),

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Tomita et al. (US 6,431,185; col. 22, lines 40-50) and Skee (US 6,465,403; Table 17A-17E) as evidence. Verhaverbeke discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning, which clearly shows that temperature is a recognized result-effective variable in the art of wet cleaning. Tomita and Skee show the pH value is a recognized result-effective variable in the art of wet cleaning.

***Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical ( i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). In re Woodruff, 16USPQ2d 1934,1936 (Fed. Cir.1990); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809; In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.***

***"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" Ex parte Khusid, 174 USPQ 59.***

5. Claims 11, 12,14, 23, 24,28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al. (US 5,635,053; hereinafter "Aoki") in view of Hall (US 4,326,553) or Bran (US 6,039,059) as evidenced by Okuda et al. (US 2002/0035762), Verhaverbeke (US 5,972,123), Tomita et al. (US 6,431,185; hereinafter "Tomita") and Skee (US 6,465,403).

Aoki (col.1 lines 36 to 47) teaches a first step of applying a mixed solution containing an ammonia water and hydrogen peroxide water and a second step of applying a mixed solution containing hydrochloric acid and hydrofluoric acid to efficiently clean the surface of a substrate. Aoki teaches using the cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (col. 1,line 42, see also the example starting from col. 1, line 46). Aoki also clearly describes the function of each cleaning solution (specifically, col. 2, lines 28-45). Hence, it would have been

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obvious to one with ordinary skill in the art to apply cleaning solutions (alkaline solutions and acid solutions) in multiple steps **in any combinations** (or repeating the process) as required for a particular product in order to achieve the required cleanness.

The claimed invention differs from the prior art by specifying conventional method of applying megasonic vibrations to the solution. Hall (abstract; col. 2, lines 12-25) or Bran (US 6,039,059; abstract; col. 1, lines 10-15) is only relied on to show the conventional method of applying megasonic vibrations to the solution. Because it is a convention method and because it is disclosed by Hall or Bran, it would have been obvious to one with ordinary skill in the art to apply megasonic vibrations to the solution in the process of Aoki in order to effectively remove the particles.

Claims differ from the combined prior art by specifying well-known feature (such as the substrate may be rotated in a horizontal plane during the process in claim 11; using nozzle to inject droplets of the alkaline solution in claim 28) to the art of semiconductor device fabrication, the examiner takes official notice. A person having ordinary skill in the art would have found it obvious to modify the prior art by incorporating the well-known features to same in order to improve the efficiency of the cleaning process with a reasonable expectation of success. See Okuda (abstract; [0028], [0165][0295]; Figures) as evidence. It is noted that applicant did not traverse the aforementioned conventionality (e.g., well-known features, common knowledge), which have been stated in the previous office action (January 5, 2007).

The above-cited claims differ from the prior art by specifying various process parameters (such as ordinary temperature in claims 11 and 23; pH value in claim 24)

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for the alkaline and acid solutions. However, same are known to be result-effective variable and commonly determined by routine experiment. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In the absence of showing criticality or new, unexpected results, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using ordinary temperature and adjusting concentration of alkaline solution for desired pH value) to obtain optimal result with a reasonable expectation of success. See the case laws cited below. Also see Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45) Tomita et al. (US 6,431,185; col. 22, lines 40-50) and Skee (US 6,465,403; Table 17A-17E) as evidence. Verhaverbeke discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning, which clearly shows that temperature is a recognized result-effective variable in the art of wet cleaning. Tomita and Skee show the pH value is a recognized result-effective variable in the art of wet cleaning.

**Changes in compositions, temperature, concentrations, or other process conditions of a process do not impart patentability unless the recited ranges are critical ( i.e., they produce a new and unexpected result that differs in kind and not merely in degree from the result of the prior art). *In re Woodruff*, 16USPQ2d 1934,1936 (Fed. Cir.1990); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809; *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). MPEP 2144.05 II.**

## CRITICALITY OF PROCESSING PARAMETERS

***"Where the principal difference between the claimed process and that taught by the reference is a temperature difference, it is incumbent upon applicant to establish criticality of that difference" Ex parte Khushid, 174 USPQ 59.***

The combined prior art is silent about that the etching effect may take place when applying the acid solution in the second step. However, when same acid solution is



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applied on the same surface of the substrate, it would be expected that the method of the combined prior art would contain the same properties and functions as claimed (such as etching effect on the surface of the substrate).

### ***Response to Arguments***

6. Applicant's arguments filed June 5, 2007 have been fully considered but they are not persuasive.

Applicant has argued that the combined prior art does not teach that the etching effect may take place when applying the acid solution in the second step. It is not persuasive. As has been stated in the office action, when same acid solution is applied on the same surface of the substrate, it would be expected that the method of the combined prior art would contain the same properties and functions as claimed (such as etching effect on the surface of the substrate). Therefore, the combined prior art teaches the claimed limitation.

### ***Conclusion***

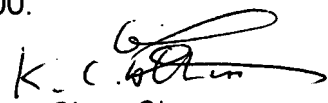
7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Verhaverbeke (US 5,972,123; col. 5, lines 25-29; 43-45) discloses that the exposure time, temperature, and concentration may vary in wet etching or cleaning. Tomita et al. (US 6,431,185; col. 22, lines 40-50) teaches the theory

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and principles in pH dependency on the cleaning of the semiconductor substrate. Skee (US 6,465,403; Table 17A-17E) shows the effect of the pH and composition /concentration on the cleaning of the semiconductor substrate.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

July 12, 2007

  
Kin-Chan Chen  
Primary Examiner  
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